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**Jean-Louis H. GUERET** )  
 )  
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For: COSMETIC APPLICATOR )

**SUBMISSION OF ENGLISH LANGUAGE TRANSLATION OF**  
**PROVISIONAL APPLICATION**

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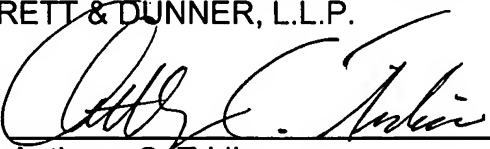
Sir:

Applicant hereby submit an English language translation of Provisional Application  
No. 60/460,979, filed April 8, 2003, in advance of any requirement from the Patent  
Office. It is requested that this translation be placed in the provisional application file  
wrapper.

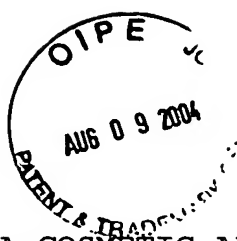
Respectfully submitted,

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A COSMETIC APPLICATOR

The present invention relates to an applicator for applying a cosmetic (where the term "cosmetic" is used to include care products), and in particular it relates to  
5 an applicator for nail varnish or mascara.

Various applicators for the nails or the eyelashes and comprising a mixture of bristles have already been proposed.

Thus, European patent application EP 0 556 081  
10 discloses a varnish brush for applying varnish to the nails, the brush comprising a mixture of bristles of different diameters.

European patent EP 0 239 270 describes a mascara brush combining flexible bristles and stiff bristles so  
15 as to increase the amount of mascara that can be picked up and so as to improve combing of the eyelashes.

European patent application EP A 0 651 955 discloses a brush for applying varnish to the nails, the brush comprising two sets of bristles having different  
20 mechanical properties in order to form relatively large spaces between the bristles and retain a larger quantity of varnish.

Furthermore, US patent No. 5 161 554 discloses a mascara brush comprising bristles of cross-section that  
25 alternates between a large diameter and a small diameter over the entire length of the bristles..

There exists a need to further improve the performance of a cosmetic applicator, in particular the amount of cosmetic it can carry, while still providing an  
30 applicator that is reliable and simple to manufacture.

There also exists a need for a cosmetic applicator to be available that is capable of applying substances having a variety of viscosities.

The invention seeks in particular to satisfy all or  
35 some of these requirements.

In a first aspect amongst others, the invention thus provides a cosmetic applicator, in particular for

applying nail varnish or mascara, the applicator comprising at least two applicator elements, in particular two bristles or two teeth, each presenting at least one periodic pattern presenting at least one  
5 undulation, at least two periodic patterns being different.

In another of its aspects, the invention also provides an applicator for applying a cosmetic, in particular nail varnish or mascara, the applicator  
10 comprising at least two bristles each presenting at least one periodic pattern, at least two periodic patterns being different.

In another of its aspects, the invention also provides an applicator for applying a cosmetic, in particular nail varnish or mascara, the applicator  
15 comprising at least two bristles each presenting at least one undulating portion, the undulating portions of the two bristles differing from each other at least in their shape and/or their frequency and/or their amplitude, at  
20 least one of the undulating portions preferably presenting a pattern that repeats periodically.

The term "periodic pattern" designates a portion of an applicator element which may be a bristle, said portion being substantially reproduced in periodic manner  
25 along the applicator element.

A periodic pattern presenting at least one undulation can be determined by three components, namely its shape, e.g. sinusoidal or sawtooth, its amplitude, i.e. its size measured in a direction orthogonal to the  
30 general longitudinal direction of the applicator element, and its spatial frequency, i.e. the number of patterns reproduced per unit length of the applicator element. The same pattern may be repeated several times over the entire length of the applicator element. An applicator  
35 element may present a single pattern or less than a single pattern.

The length of the pattern may correspond substantially to the length of the applicator element. In which case, the shape of the pattern may be defined by a periodic function such as a sinusoidal function or a sawtooth generator, for example.

By way of example, a bristle presenting a periodic pattern may be made by being cut from a fiber of greater length in which the pattern is present several times over. The manufacture of such a fiber is made easier by the fact that the pattern repeats periodically.

In particular, when the applicator element is a bristle, a periodic pattern may also present at least one portion of roughness which may be associated, for example, with the presence of one or more fillers in the material of the bristle or on its surface, or it may include one or more notches. The periodic pattern may be determined by the frequency and the shape of said notches, or by the frequency and the distribution per unit area of the filler(s) within a given pattern.

A periodic pattern may also be formed by periodically varying the cross-section of the bristle on traveling along the bristle.

A periodic pattern of a bristle may present at least one undulation and/or at least one filler and/or at least one variation in the cross-section of the bristle and/or a notch and/or other portions in relief.

An advantage of the present invention is that it encourages the formation of spaces between bristles, which makes it easier to retain substance by capillarity, compared with configurations in which all the bristles used are entirely rectilinear or in which they all have the same pattern. This improves the amount of substance the applicator can retain, thus enabling a user to apply the substance, in particular on the nails, in a single layer that is of sufficient thickness.

Another advantage of the present invention, where appropriate, is that it makes it possible, while the

applicator is passing through a wiper, to retain more substance between the bristles than in an applicator having bristles that are rectilinear or that present the same pattern.

5 By means of the periodic patterns, and in particular by means of undulating portions, the applicator elements may present greater flexibility than applicator elements that are purely rectilinear.

10 With bristles presenting different periodic patterns, the distribution of the free ends of the bristles can be more uniform.

Two different periodic patterns may belong to two distinct bristles. In a variant, two different periodic patterns may belong to the same bristle.

15 Different periodic patterns may present undulations of different shapes. For example, one of the patterns may present a sawtooth shape while the other presents a sinusoidal shape.

20 Different periodic patterns may also present undulations of different amplitudes. The patterns may be of the same shape, i.e. both of them may be sawtooth patterns or both of them may be sinusoidal patterns, or they may have different shapes. The patterns may or may not have the same spatial frequency.

25 The amplitude of a pattern may lie in the range 20 micrometers ( $\mu\text{m}$ ) to 3 millimeters (mm), for example.

30 Different periodic patterns may also present undulations of different spatial frequencies. Such patterns may, where appropriate, present the same shape and the same amplitude.

The spatial frequency of a pattern may lie in the range  $1/24^{\text{th}}$  to  $1/4^{\text{th}}$ , of a pattern per millimeter of bristle, for example.

35 Two different periodic patterns presenting undulations may simultaneously present shapes that are different, amplitudes that are different, and spatial

frequencies that are different, or they may differ solely in two of their three components.

The applicator may present more than two sets of bristles with different periodic patterns.

5       The proportion of bristles presenting the same pattern may vary to a large extent. For example, the applicator may comprise 50% bristles with a first pattern and 50% bristles with a second pattern that is different from the first. This distribution may be modified and  
10       the applicator may comprise, 1% to 99% bristles with a first pattern, better 20% to 80%, better still 30% to 60%, these values not being limiting.

      The applicator may include at least one bristle presenting at least one rectilinear portion, or indeed a  
15       bristle that is entirely rectilinear.

      The applicator may include at least one bristle having at least one rectilinear portion and at least one periodic pattern presenting at least one undulation.

      At least one of the bristles may include periodic  
20       patterns along its entire length.

      The applicator may include at least two bristles of different lengths.

      At least one bristle may be twisted, at least over a fraction of its length.

25       By way of example, the applicator may include bristles of diameter lying in the range  $5/100^{\text{ths}}$  of a millimeter to  $40/100^{\text{ths}}$  of a millimeter.

      The applicator may include at least two bristles of different diameters.

30       When the bristle is not circular, the term "bristle diameter" is used to mean the diameter of the circle circumscribing the largest cross-section of the bristle.

      The bristles may be made of synthetic material, e.g. being made of a thermoplastic material, in particular a  
35       thermoplastic elastomer.

      At least one bristle may be made of natural fiber.

The bristles may be of different kinds, for example they may be made out of materials having different vitreous transition temperatures.

The bristles may present cross-sections that are  
5 solid or hollow, circular or otherwise, the cross-sections being constant or otherwise along the length of a bristle, for example alternating between sections of large diameter and sections of small diameter. The bristles may optionally carry a coating of flocking.

10 As mentioned above, the bristles may also include a filler over their entire length or over a fraction only thereof, e.g. a magnetic compound, a moisture-absorbing compound, a compound for creating roughness at the surface of the bristle, or indeed a compound for  
15 improving sliding. The filler may be distributed in such a manner as to create a periodic pattern.

The applicator may comprise a brush, in particular a mascara brush. The undulating bristles may make it possible to obtain a distribution of the free ends of the  
20 bristles along the brush that is more uniform than with rectilinear bristles.

In addition, undulating bristles can cross one another and increase the amount of substance that can be picked up and improve the combing of eyelashes or  
25 eyebrows, where appropriate.

The brush may include a twisted core and the bristles may be supported by the core and made other than by being injection-molded together with the core. In a variant, the brush may include a row of bristles secured  
30 by adhesive, by stapling, or by overmolding. In a variant, the bristles may be secured by stamping a support. The brush may be arranged to pick up substance from a cake of substance. The bristles may extend from one side only of a support.

35 The envelope surface of the brush may present a variety of shapes, and in particular cross-sections that

are substantially circular, oval, polygonal, or other, with one or more notches or indentations.

The core may be centered or otherwise relative to a cross-section of the envelope surface.

5       The cross-section of the envelope surface may be constant or otherwise over at least a fraction of the length of the brush, and by way of example the brush may present a cross-section that passes through an extremum between its two axial ends, said extremum being a maximum  
10       or a minimum, for example.

      The core may be rectilinear or otherwise, and in particular it may be curved, with curvature being distributed over its entire length or localized solely in a region close to that where the brush is fixed to a stem  
15       of an applicator. Where appropriate, the brush may be curved about at least two axes that are not coplanar.

      With a twisted core, the brush may present five to 60 bristles per turn, for example. The number of bristles per turn corresponds to the number of bristle  
20       ends that can be counted by a stationary observer while turning the brush through 180° about its core.

      The length of the bristles may lie in the range 1 mm to 7 mm, and in particular in the range 2 mm to 5 mm.

      The applicator may also be in the form of a paint  
25       brush, in particular a brush for applying varnish to nails.

      Under such circumstances, the applicator may comprise a stem and a bundle of bristles fixed in a housing at an end portion of the stem, it being possible  
30       for the bristles to be fixed by adhesive, stapling, or overmolding, in particular. The housing may present a cross-section that is oblong, along a transverse axis of greater length.

      The housing may present a cross-section that tapers  
35       towards its inside end, this taper possibly corresponding to a flare desired for the bristles. The end wall of the housing may include a setback in which the bristles are



secured opening out into a portion of the housing that flares towards its opening, said flared portion enabling the bristles to splay apart from one another in order to confer an enlarged shape on the bundle.

5           In particular, the housing may be arranged in such a manner that the bristles extend outside the housing over a distance measured parallel to the above-mentioned transverse axis that is greater than the dimension of the stem along said transverse axis level with the housing.

10           The length of the portion of the bristles extending outside the housing in the stem may lie in the range 5 mm to 20 mm, for example.

          The free ends of the bristles may describe substantially an arc of a circle having a radius of curvature lying in the range 2 mm to 15 mm, for example, and in particular lying in the range 4 mm to 10 mm.

          The width of the opening into the housing, measured perpendicularly to the above-specified transverse axis, may be less than or equal to 2 mm.

20           In another of its aspects, the invention also provides a packaging and applicator device for a substance for applying to the nails, in particular a nail varnish, the device comprising a receptacle containing the substance for application and an applicator as defined above.

          The greater transverse dimension of the portion of the stem immersed in the substance contained in the receptacle when the applicator is in place thereon, may be less than or equal to 5 mm.

30           The stem may be arranged for fixing to a closure cap for the receptacle; in a variant, the stem may be made integrally as a single molding of plastics material including a closure cap for the receptacle.

          In another of its aspects, the invention also provides a conditioning and applicator device for a substance for application to the eyelashes or the eyebrows, in particular a mascara, the device comprising

a receptacle containing the substance for application and an applicator as defined above. Where appropriate, the device may further comprise a member for wiping the applicator.

5       The invention can be better understood on reading the following detailed description of non-limiting embodiments thereof and on examining the accompanying drawings, in which:

10       · Figure 1 is a diagrammatic axial section view of a device for applying a substance to the nails;

      · Figure 2 is a diagram showing an example of an undulating portion of a bristle;

15       · Figure 3 is a diagram showing an undulating portion of shape that is different from the shape of the Figure 2 pattern;

      · Figure 4 is a diagram showing two undulating portions with patterns of the same shape but differing amplitudes and spatial frequencies;

20       · Figure 5 is a diagram showing two undulating portions with patterns of the same shape but with differing spatial frequencies;

      · Figure 6 is a diagram showing two undulating portions with patterns of differing shapes;

25       · Figure 7 is a diagram showing three bristles, one of which is rectilinear and the other two present undulating portions;

      · Figure 8 is a diagram showing two undulating portions made with bristles of different diameters;

30       · Figure 9 is a diagram of the end of a brush made with bristles of different diameters;

      · Figure 10 is a diagram of a bristle presenting two undulating portions with differing periodicities and amplitudes;

35       · Figure 11 is a diagram of a bristle presenting a rectilinear portion and an undulating portion;

      · Figure 12 is a diagram of a portion that is undulating and twisted;

· Figure 13 is a cross-section on XIII-XIII of the Figure 12 bristle;

· Figure 14 is a diagram of a portion of a bristle presenting a notch periodic pattern;

5       · Figures 15 and 16 are diagrams of bristle portions presenting other examples of periodic patterns;

· Figure 17 is a diagram of a bristle portion presenting another example of a periodic pattern;

10       · Figures 18 to 21 are diagrams of other examples of pairs of bristles presenting differing periodic patterns;

· Figure 22 is a diagrammatic and fragmentary elevation view of the end portion of a brush made in accordance with the invention;

· Figures 23 and 24 show variants of Figure 22;

15       · Figures 25, 26, and 27 show examples amongst others of cross-sections for a bundle of bristles for an applicator of the invention;

· Figures 28 and 29 show two examples of housings in which the bristles of a brush can be secured;

20       · Figures 30 and 31 show how bristles can be secured to the stem of the applicator by means of a staple;

· Figure 32 shows another method of securing bristles to the stem of the applicator;

25       · Figure 33 is a diagrammatic axial section of an applicator and packaging device for a substance for application to the eyelashes or the eyebrows;

· Figure 34 is an end view of the brush seen looking along arrow XXXIV of Figure 33, showing the distal end of the brush in highly diagrammatic manner;

30       · Figure 35 is a diagrammatic and fragmentary view showing the bristles taken between the twisted branches of the core of the Figure 33 brush;

· Figure 36 is a diagram showing a variant of the cross-section of the Figure 33 brush;

35       · Figures 37 to 47 are diagrammatic cross-sections showing possible shapes amongst others for the envelope of the brush;

- Figure 48 shows how the core of the brush may be off-center;

- Figure 49 is a diagram of a dual core, the bristles being omitted;

5       · Figures 50 to 66 show various examples of bristle cross-sections amongst others;

- Figures 67 to 71 show examples of bristle end portions; and

10       · Figure 72 is a diagrammatic and fragmentary cross-section view of an applicator presenting undulating teeth with different periodic patterns.

Figure 1 shows a device 1 for packaging and applying a substance to the nails, e.g. a nail varnish V, the device 1 comprising a receptacle 2 containing the varnish V and an applicator 3 constituting a brush and comprising a rectilinear stem 4 along a longitudinal axis X fitted at one end with a bundle of bristles 5 and at its other end with a handle member 10 also constituting a closure cap for the receptacle 2.

20       As shown, the receptacle 2 may contain a ball 6, e.g. a metal ball, enabling the varnish V to be made more uniform prior to application by shaking the device 1.

The stem 4 which is made of a plastic material, for example, presents a skirt 8 at its top end enabling it to be secured in a housing of the handle member 10, the handle member being configured for screwing onto the neck 11 of the receptacle 2. A collar 12 is formed at the base of the skirt 8 so as to bear against the top end edge of the neck 11 when the applicator is in place on the receptacle 2.

30       In the example described, beneath the collar 12, the stem 4 comprises a conical portion 13 that possibly contributes to sealing the closed receptacle 2 when the applicator 3 is in place thereon. Sealing can also be obtained by co-operation between surfaces of the handle member 10 and of the neck 11 of the receptacle.

The stem 4 also has a bottom end portion 14 which is provided with a housing 15 (not visible in Figure 1 but shown in Figure 28), within which the bristles of the brush are secured.

5        In accordance with an aspect of the invention, the bundle 5 of bristles presents at least two undulating portions of different patterns.

Figure 2 shows an undulating portion 20 of a bristle comprising a plurality of identical periodic patterns, and more precisely three in the example shown, each of them being sinusoidal in shape. Each pattern in Figure 2 is defined between two vertical dashed lines. One undulation may correspond to succession of at least one indented portion in relief and one projecting portion in relief.

The components of a pattern presenting an undulation are its shape, its amplitude a, and its spatial frequency, i.e. the number of patterns per unit length of bristle.

20        The pattern may be other than sinusoidal, for example it may be of sawtooth shape as shown in Figure 3. For a sawtooth pattern in particular, the amplitude a lies, for example, in the range 20  $\mu\text{m}$  to 3 mm. The spatial frequency lies, for example, in the range  $1/24^{\text{th}}$  to  $1/4^{\text{th}}$  of a pattern per millimeter, the length of a pattern lying, for example, in the range 1 mm to 24 mm, or indeed in the range 4 mm to 24 mm.

30        Figure 4 shows two undulating portions 20 with patterns of the same shape but of differing amplitudes and spatial frequencies. Spaces 21 are formed between the undulating portions, these spaces 21 serving to retain substance by capillarity when the user withdraws the applicator 3 from the receptacle 2.

35        The undulating portions 20 with differing patterns enable a bundle 5 to be obtained that is more spaced out, easily capable of picking up substance.

The undulating portions 20 of sawtooth shape in Figure 5 are of the same amplitude but of differing spatial frequencies, thereby likewise enabling spaces 21 to be obtained between the bristles.

5        Figure 6 shows two undulating portions 20, one with patterns of sawtooth shape and the other with patterns of sinusoidal shape.

      All of the bristles in the bundle 5 may be undulating, or in a variant and as shown in Figure 6, the  
10       bundle may also include bristles 23 that are rectilinear.

      The undulating portions can be made by extruding fibers through a small diameter die and then bringing the fibers into contact with profiled rollers, e.g. in the form of gearing.

15       The bristles of a given bundle may have different diameters, as shown in Figure 8.

      Figure 9 is a cross-section through a bundle 5 comprising small-diameter bristles, e.g. having a diameter of 5/100<sup>ths</sup> of a millimeter, and bristles of  
20       larger diameter, e.g. of 40/100<sup>ths</sup> of a millimeter.

      A bristle may comprise an undulating portion 20 extending over the entire length of the bristle or over a fraction of its length only, or it may present a plurality of undulating portions with different patterns.  
25       By way of example, Figure 10 shows two undulating portions 20a and 20b of a single bristle presenting respective patterns having the same shape, namely a sinusoidal shape, but of differing amplitudes and spatial frequencies. The patterns of two undulating portions of  
30       a single bristle may differ in one, two, or all three components of the pattern, as can the patterns of two undulating portions belonging to two distinct bristles.

      Figure 11 shows a single bristle presenting both a rectilinear portion and an undulating portion.

35       The bristle may be both undulating and twisted simultaneously. Figure 12 shows a bristle of non-circular cross-section that includes a capillary groove

22 as can be seen in Figure 13. The bristle is twisted so that the capillary groove 22 forms a helix along the bristle.

5 A periodic pattern may present an undulation as described above, but it may also be constituted by a portion of bristle that repeats in periodic manner. By way of example, the pattern may thus correspond to a portion of bristle including a notch 100, the bristle being marked at regular intervals with notches, as shown  
10 in Figure 14.

A periodic pattern may also be constituted by a portion of bristle presenting in succession cross-sections 101 of small diameter and cross-sections 101 of larger diameter, as shown in Figure 15.

15 In Figure 16, the periodic pattern is constituted by a certain distribution of particles 103 of a filler, which distribution repeats substantially at regular intervals along the bristle.

Naturally, a bristle may present a portion that is  
20 both undulating and provided with particles 103 of a filler disposed at regular intervals, as shown in Figure 17.

As shown in Figure 18, two bristles with different patterns may comprise a rectilinear bristle having  
25 regular notches 100 and a bristle presenting an undulating portion 20.

Figure 19 shows the possibility of mixing in a single applicator, bristles presenting respective undulating portions, one of them also including a filler  
30 that is distributed in periodic manner.

Figure 20 shows the possibility of mixing bristles comprising undulating portions with or without notches 100.

Figure 21 shows the possibility of mixing bristles  
35 comprising undulating portions with notches disposed differently on the bristles.

The length of the bristles in the bundle 5 may be selected in such a manner that the free ends of the bristles are contained substantially in a common plane perpendicular to the longitudinal axis X of the stem 4, as shown in Figure 22. In a variant, the free ends of the bristles in the bundle 5 may be situated on a surface C that is not plane, for example convex going away from the stem 4 as shown in Figure 23. In another variant, shown in Figure 24, the free ends of the bristles of the bundle 5 may be situated substantially along a surface extending obliquely relative to the axis X of the stem.

The bundle 5 of bristles may present different shapes in cross-section. In Figure 25, the brush is flat, the section of the bundle 5 being substantially rectangular. In Figure 26, the brush is round, the cross-section of the bundle 5 being circular, whereas in Figure 27, the cross-section of the bundle 5 is curved in shape so as to constitute a better fit to the shape of a nail.

As shown in Figure 28, the housing 15 receiving the bundle 5 may present a cross-section that is constant, thus making it possible, for example, to obtain a brush with bristles that are relatively tight. By giving the housing 15 a shape that diverges towards the outside, the bristles can spread apart to a greater extent from one another so as to form a broader bundle of bristles, as shown in Figure 29.

The length  $\ell$  of the portion of the bristles extending outside the housing 15 may lie in the range 5 mm to 20 mm, for example.

The bristles of the bundle 5 may be secured in the housing 15 by stapling, adhesion, melting, or overmolding.

Figures 30 and 31 show the bundle 5 being secured in the housing 15 by stapling using a staple 30. The staple is engaged around the zone situated substantially halfway along the bundle 5 of bristles and it is pushed into the



housing 15, thereby causing the bristles to fold in half and press against the edge of the housing 15. The staple 30 is engaged as a force-fit inside the stem 4 of the applicator 3.

5        Another way of inserting the bundle 5 in the housing 15 of the stem 4 is to apply adhesive as shown in Figure 32, and then to insert the bundle by force into the stem 4 or to staple it therein. The varnish V contains a solvent suitable for dissolving the film of  
10       adhesive deposited on the bristles when the brush is immersed in the varnish V contained in the receptacle 2.

      Prior to having adhesive applied thereto, the bundle 5 may be folded in two about a staple which is used for securing the bundle to the stem 4.

15       Another packaging and applicator device for a substance in accordance with the invention is shown in Figure 33.

      This device comprises a receptacle 40 containing a substance P for applying to the eyelashes or the  
20       eyebrows, e.g. mascara, and an applicator 41 comprising a stem 42 of longitudinal axis X provided at one end 42a with a brush 43 and at its opposite end with a handle member 44 that also serves to close the receptacle 40. The receptacle has a neck 45 with an outside thread so as  
25       to enable the handle member 44 to be screwed thereon.

      A wiper member 46 is fixed inside the neck 45 to wipe the stem 42 and the brush 43 as they leave the receptacle. The wiper member 46 in the example shown  
30       comprises a flexible lip 47 defining a circular orifice of diameter corresponding substantially to the diameter of the stem 42.

      Naturally, the invention is not limited to using a particular wiper member and other wiper members may be used, for example wiper members comprising a block of  
35       foam and/or defining one or more optionally-flocked slots.

In the example shown, the stem 42 is rectilinear, however it could be curved without going beyond the ambit of the present invention.

5 In addition, the stem 42 is shown as being fixed relative to the handle member 44, however it could be movable relative thereto, for example by means of an articulated connection, in particular via a ball-and-socket joint.

10 The brush 43 comprises a core 50 made up of two twisted-together metal strands, the core 50 being fixed at one end in a housing in the stem 42, e.g. being inserted as a force-fit in the housing.

15 The brush 43 also comprises bristles which are held by being clamped between the twisted-together strands of the core 50, as can be seen in Figure 35. In Figure 35, the core is shown as seen from the side with the proximal end of the brush being on the left and the distal end of the brush on the right, the brush being said to be "twisted to the left". When the core is twisted to the  
20 left, the branches of the core form turns which are seen to rise from left to right when the brush is observed while in a vertical position with its end that is fixed in the stem, i.e. its proximal end, situated at the bottom and its free end, i.e. its distal end situated at  
25 the top. The advantages of a core that is twisted to the left are described in US patent No. 6 227 735. The invention also applies to brushes having a core that is twisted to the right, and indeed to brushes having cores that are not twisted, with the bristles being fixed, for  
30 example, by being stamped into the core, as described in European patent application EP-A-1 155 637, or indeed fixed to the core by staples or by overmolding the core on the bristles.

35 The bristles of the brush 43 present undulating portions 20 which may be similar to those described above with reference to Figures 2 to 12. The bristles of the

brush 43 may also present periodic patterns as described with reference to Figures 14 to 21.

The brush may present an envelope surface defined by the free ends of the bristles, which surface is of  
5 circular cross-section as shown in Figure 34, or of cross-section that is not circular.

By way of example, Figure 37 shows an envelope surface of polygonal cross-section, e.g. triangular section.

10 Figures 38 to 47 show other possible cross-section shapes for the envelope surface of the brush, amongst other possibilities.

Figure 38 thus shows a cross-section of square shape, Figure 39 a cross-section of pentagonal shape, and  
15 Figure 40 a cross-section of hexagonal shape. Figure 41 shows a cross-section that is substantially oval in shape.

Figures 42 and 43 show that it is possible to use the brush with at least one notch 55, which may be  
20 outwardly concave as shown, the notch presenting a cross-section that is constant or otherwise on traveling along the brush. The notch 55 may be made in a brush of circular cross-section as shown in Figure 42, or of non-circular cross-section, e.g. triangular section, as shown  
25 in Figure 43. In the triangular case, the notch may constitute an entire side of the triangle as shown, in which case the brush presents a facet that is concave.

Figure 44 shows that it is possible to make at least one substantially plane facet on the brush.

30 Figure 45 shows that it is possible to make the brush with at least one indentation 57, and specifically with three indentations. Figure 46 shows a variant embodiment of a brush presenting two indentations 57, and Figure 47 corresponds to a variant embodiment having only  
35 one.

The brush may present a cross-section that is constant or otherwise, and its core may be rectilinear or otherwise.

5 The core 50 may be centered or off-center relative to the outline of the envelope surface when the brush is observed in cross-section. By way of example, Figure 48 shows a brush with a core that is off-center.

10 The bristles of the brush may be subjected to mechanical beating or the brush may be brought into contact with a treatment member comprising a heater element while the brush is being driven in rotation, thereby imparting permanent deformation to the bristles of the brush, as shown in Figure 36.

15 Rotation may take place in either direction, and in particular it may take place in the direction opposite to the direction in which the core is twisted, where appropriate.

20 The core may be made otherwise, for example the core may be a dual core made up of two individual cores 50' and 50" that are twisted around each other as shown in Figure 49. Each individual core 50', 50" in the figure itself comprises two strands that are twisted together and that clamp onto bristles.

25 The core may be made using metal strands of optionally circular section, which strands may optionally be sheathed.

The bristles used may present a variety of cross-sections other than circular.

30 In particular, it is possible to use bristles presenting a cross-section having any one of the shapes shown diagrammatically in Figures 50 to 66, for example a circular shape with a flat as shown in Figure 50, a flat shape as shown in Figure 51, a star shape, e.g. in the form of a cross as shown in Figure 52, or having three  
35 branches as shown in Figure 53, a U-shape as shown in Figure 54, an H-shape as shown in Figure 55, a T shape as shown in Figure 56, a V shape as shown in Figure 57, a

hollow shape, e.g. a circular shape as shown in  
Figure 58, or a polygonal shape in particular a square  
shape as shown in Figure 59, a shape that presents  
ramifications, e.g. a snowflake shape as shown in  
5 Figure 60, a polygonal shape, e.g. a triangular shape as  
shown in Figure 61, a square shape as shown in Figure 62,  
or a hexagonal shape as shown in Figure 63, an oblong  
shape, in particular a lens shape as shown in Figure 64,  
or an hourglass shape as shown in Figure 65.

10 It is also possible to use bristles having portions  
which are hinged relative to one another as shown in  
Figure 66.

Where appropriate, the bristles may be subjected to  
treatment for forming respective end balls 61 as shown in  
15 Figure 6, or end forks 62 as shown in Figure 68, or  
indeed tapering tips as shown in Figure 69.

It is also possible to use flocked bristles as shown  
in Figure 70, or indeed bristles made by extruding a  
plastics material containing a filler of particles 63 so  
20 as to impart microrelief to the surface of the bristles  
as shown in Figure 71 or so as to confer magnetic or  
other properties thereon.

The bristles may also be made out of a material  
presenting properties that encourage sliding.

25 The bristles may be made of synthetic materials  
selected, for example, from: polyethylene, polyamides and  
in particular PA6, PA6/6, PA6/10 or PA6/12, PA11, and in  
particular Rilsan®; a Hytrel-Pebax; and other  
thermoplastic polymers.

30 Naturally, the invention is not limited to the  
examples described above. In particular, implementation  
details of the various examples described above can be  
combined with one another.

The applicator may present three or more sets of  
35 undulating portions differing in pattern and/or diameter  
and/or length.

The pattern of an undulating portion may present an undulating shape that is not sinusoidal and that is other than sawtooth, and in general it may present the shape as described by any periodic function. The pattern of an undulating portion may thus have a generally squarewave shape, for example.

The applicator may include applicator elements that are not undulating bristles but that are undulating teeth, as shown in Figure 72, where two undulating teeth 110 present different periodic patterns. These teeth 110 may be made by molding a plastics material together with a support 111. The support material and the material of the teeth may be identical or not.

Throughout the description, including in the claims, the term "comprising a" should be understood as being synonymous with "comprising at least one" unless specified to the contrary.

CLAIMS

1. A cosmetic applicator (3; 41), in particular for applying nail varnish (V) or mascara (P), the applicator comprising at least two applicator elements, each  
5 presenting at least one periodic pattern presenting at least one undulation, at least two periodic patterns being different.
2. An applicator according to claim 1, characterized by  
10 the fact that the applicator elements are bristles.
3. A cosmetic applicator, in particular for applying nail varnish or mascara, including at least two bristles, each presenting at least one periodic pattern, at least two  
15 periodic patterns being different.
4. An applicator according to claim 2 or claim 3, characterized by the fact that the two different periodic patterns belong to two distinct bristles.  
20
5. An applicator according to any one of claims 2 to 4, characterized by the fact that the two different periodic patterns belong to the same bristle.
- 25 6. An applicator according to any one of claims 2 to 5, characterized by the fact that the two different periodic patterns present undulations of different shapes.
7. An applicator according to the preceding claim,  
30 characterized by the fact that one of the periodic patterns presents a sawtooth shape, the other a sinusoidal shape.
8. An applicator according to any one of claims 2 to 7,  
35 characterized by the fact that the two different periodic patterns present undulations of different amplitudes (a).

9. An applicator according to any one of claims 2 to 8, characterized by the fact that the two different periodic patterns present undulations of different spatial frequencies.

5

10. An applicator according to any one of claims 2 to 9, characterized by the fact that it includes 1% to 99% bristles presenting the same periodic pattern, better 20% to 80%, better still 30% to 60%.

10

11. An applicator according to any one of claims 2 to 10, characterized by the fact that it includes at least two bristles of different diameters.

15

12. An applicator according to any one of claims 2 to 11, characterized by the fact that it includes at least one bristle presenting at least one rectilinear portion.

20

13. An applicator according to any one of claims 2 to 12, characterized by the fact that at least one of the bristles presents periodic patterns along its entire length.

25

14. An applicator according to any one of claims 2 to 13, characterized by the fact that it includes at least two bristles of different lengths.

30

15. An applicator according to any one of claims 2 to 14, characterized by the fact that it includes at least one twisted bristle.

35

16. An applicator according to any one of claims 2 to 15, characterized by the fact that it includes at least one bristle presenting a cross-section that is circular.



17. An applicator according to any one of claims 2 to 15, characterized by the fact that it includes at least one bristle presenting a cross-section that is not circular.

5 18. An applicator according to any one of claims 2 to 17, characterized by the fact that it includes at least one bristle presenting a cross-section that is hollow.

10 19. An applicator according to any one of claims 2 to 17, characterized by the fact that it includes at least one bristle presenting a cross-section that is solid.

15 20. An applicator according to any one of claims 2 to 19, characterized by the fact that the bristles are of a diameter lying in the range  $5/100^{\text{ths}}$  of a millimeter to  $40/100^{\text{ths}}$  of a millimeter.

20 21. An applicator according to any one of claims 2 to 20, characterized by the fact that the bristles are made of a thermoplastic material, in particular a thermoplastic elastomer.

25 22. An applicator according to any one of claims 2 to 20, characterized by the fact that at least one bristle is made of natural fiber.

30 23. An applicator according to any one of claims 2 to 22, characterized by the fact that it includes bristles of different kinds.

24. An applicator according to any one of claims 2 to 23, characterized by the fact that it comprises a brush (43) in particular a mascara brush.

35 25. An applicator according to the preceding claim, characterized by the fact that the brush (43) comprises a

twisted core (50) and by the fact that the bristles are supported by the core (50).

26. An applicator according to claim 24, characterized by  
5 the fact that the brush presents a row of bristles that are secured by adhesive, by stapling, or by overmolding, or by stamping a support.

27. An applicator according to any one of claims 1 to 22,  
10 characterized by the fact that it constitutes a paint brush, in particular a brush (5) for applying nail varnish (V).

28. An applicator according to the preceding claim,  
15 characterized by the fact that it includes a stem (4) and by the fact that the bristles are secured in a housing (15) in an end portion (14) of the stem, in particular by adhesive, by stapling, or by overmolding.

29. An applicator according to claim 1, characterized by  
20 the fact that the applicator elements comprise teeth.

30. A conditioning and applicator device (1) for applying  
a substance to the nails, the device being characterized  
25 by the fact that it comprises a receptacle (2) containing the substance for application and an applicator (3) as defined in any one of claims 1 to 23, and 28.

31. A device for packaging and applying a substance to  
30 the eyelashes or the eyebrows, the device being characterized by the fact that it comprises a receptacle (40) containing the substance to be applied and an applicator (41) as defined in any one of claims 1 to 26, and 29.

32. A device according to the preceding claim,  
characterized by the fact that it includes a member (46)  
for wiping the applicator (41).

A B S T R A C T

The present invention relates to a cosmetic applicator, in particular for applying nail varnish or  
5 mascara, the applicator including at least two applicator elements each presenting at least one periodic pattern with at least one undulation, at least two periodic patterns being different.